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**FOR IMMMEDIATE RELEASE**
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# DOE-Funded Research Projects Win 36 R&D 100 Awards for 2004

**WASHINGTON, DC –** Secretary of Energy Spencer Abraham today announced that researchers at Department of Energy (DOE) national laboratories and companies with research funded by DOE have won 36 of the 100 awards given this year by *R&D Magazine* for the most outstanding technology developments with commercial potential.

The R&D 100 Awards recognize the most promising new products, processes, materials, or software developed throughout the world and introduced to the market the previous year. Awards are based on each achievement's technical significance, uniqueness and usefulness compared to competing projects and technologies.

"Investments in basic research at the Department of Energy's national laboratories historically have produced not only great science but also significant innovation and invention with promising commercial applications," said Secretary Abraham. "The DOE-funded researchers honored with 2004 R&D 100 Awards deserve great credit for carrying on this outstanding tradition, which has contributed substantially to our Nation's economic development."

The DOE researchers winning the highly prestigious 2004 R&D 100 Awards work in 11 of the department's laboratories across the country. Eleven of the awards are shared with businesses and universities. Five of the awards are for research at companies or universities funded by DOE.

The winning technologies advance the department's national security, energy security, environmental restoration and science missions. They will lead to new or enhanced tools for national and homeland security, yield significant energy savings, enable development of new energy sources, help mitigate environmental impacts of certain chemicals and processes and provide scientists with innovative or improved research capabilities.

The award-winning technologies and products were selected by the editors of *R&D Magazine* and a panel of some 60 outside experts. Widely recognized in industry, government, and academia as a mark of excellence for the most innovative ideas of the year, the R&D 100 Awards are the only industry-wide competition rewarding the practical applications of science.

Since the *R&D Magazine* annual competition began in 1962, DOE and its national laboratories have won 669 R&D 100s. Information about them is available at **http://www.science.doe.gov/sub/Accomplishments/100_awards/2003rd100.htm**.

The complete list of 2004 R&D 100 Awards appears in the September 2004 issue *R&D Magazine* (at **www.rdmag.com**). The winners will be recognized at *R&D Magazine*'s 42nd annual awards banquet to be held on October 14, 2004, in Chicago, where the magazine is based.

A list of the winning technologies and the DOE national laboratories and companies associated with each award follows. Links to the laboratories' news releases about their awards also are provided.

## Department of Energy-Funded R&D 100 Award Winners

**Argonne National Laboratory (Argonne, Ill.)**

- A hydrogen transport membrane that is expected to advance the hydrogen economy by enabling the economical and environmentally friendly production of pure hydrogen gas by selectively separating hydrogen from gas mixtures generated by fuel processes; the membrane has the potential to separate hydrogen from coal-gas streams and is thus a key technology for the direct production of hydrogen fuel from coal. (Project funding managed the National Energy Technology Laboratory.)
- The Grancrete bonded phosphate ceramic construction spray-on structural cement that can be used to produce long-lasting, easily maintained housing for a large segment of the world's population that could not previously obtain adequate shelter. Jointly with Casa Grande International.
- A three-dimensional, multiphase computer code to model glass furnace design and performance inexpensively and thereby lead to higher efficiency and increased productivity.
- A powertrain system analysis toolkit software that lets vehicle designers compare advanced powertrain configurations, including hybrid and fuel cell vehicles, and develop realistic control strategies.

**http://www.anl.gov/Media_Center/News/2004/news040709.html**

**Brookhaven National Laboratory (Upton, NY)**

- An autoinduction system that simplifies the production of proteins in the T7 gene expression system, widely used to produce specific proteins within bacterial cells so researchers can analyze their structures and functions.

**http://www.bnl.gov/bnlweb/pubaf/pr/2004/bnlpr072804.htm**

**Idaho National Engineering and Environmental Laboratory (Idaho Falls, Idaho)**

- An enzyme that catalyzes the decomposition of hydrogen peroxide into oxygen and water at high temperature and pH. The enzyme could have a major impact on textile, food and pulp and paper industries industries by enabling conversion to environmentally safe, cost-effective hydrogen peroxide processes as oxidizing and antimicrobial agents.
- The INEEL Geologic and Environmental Probe System, a multifunction probe system that safely characterizes and monitors conditions within or below suspected contaminated sites.

**http://newsdesk.inel.gov/press_releases/2004/08-11R&D_Awards.htm**

**Lawrence Berkeley National Laboratory (Berkeley, Calif.)**

- An electrochromic window technology that can be programmed to respond to local sunlight and weather conditions and thereby save a fourth or more of the energy lost through windows, currently worth more than $33 billion a year.
- A synthetic rotational nanomotor, the smallest ever reported, that can run indefinitely without wearing down and is rugged enough to withstand the harshest of environmental conditions, with such potential applications as bio and environmental sensors, cell phones, PDAs, optics and airbags.

**http://www.lbl.gov/Science-Articles/Archive/Lab-RD100-awards-2004.html**

**Lawrence Livermore National Laboratory (Livermore, Calif.)**

- The Autonomous Pathogen Detection System, an automated, podium-sized instrument that can monitor the air for all three types of biological agents -- bacteria, viruses and toxins.
- A diode-pumped pulsed laser that can be used to uncover and safely neutralize buried landmines, of which there are an estimated 100 million in some 70 nations worldwide.
- Inductrack, a magnetic levitation system that uses new arrangements of permanent magnets to create its levitating fields and offers a simple, low-cost solution to this country's growing need for efficient intercity and urban transportation networks. Jointly with General Atomics.
- A software architecture called Chromium that provides a way for interactive two- and three-dimensional graphics applications to take full advantage of powerful distributed, clusters of off-the shelf personal computers. Jointly with Stanford University, the University of Virginia and Tungsten Graphics.
- A breakthrough tool for ribonucleic acid (RNA) interference called siHybrids that increases the silencing effect and duration of the gene-silencing technique that has revolutionized laboratory research and clinical therapy.

**http://www.llnl.gov/llnl/06news/NewsReleases/2004/NR-04-07-02.html**

**Los Alamos National Laboratory (Los Alamos, N.M.)**

- The 10-gigabit ethernet network card that delivers information electronically at speeds 148,000 times faster than a model connection and more than 23,000 times faster than a DSL connection. The card has the potential to increase vastly the speed of electronic transmissions and data transactions in commerce, banking, medicine, scientific modeling and simulation and the Internet. Jointly with Intel Corporation.
- The confocal x-ray fluorescence microscope, an analysis instrument capable of doing elemental depth profiles and three-dimensional elemental images of material composition that could be used for crime scene evidence analysis. Jointly with X-Ray Optical Systems Inc.
- Clustermatic, a revolutionary software suite for managing, monitoring, administering and operating clusters on network-connected computers running as a high performance system.
- mpiBLAST, an open-source enhancement of BLAST, a widely used genomic-sequencing software tool, that substantially reduces the search time of a genomic sequence and thereby could reduce costs in the field of genomic sequencing.
- Plasma-torch production of spherical boron nitride particles, an innovative method for producing particles that can be used as filler in integrated circuit packages, enabling electronic devices to run cooler and faster.

**http://www.lanl.gov/worldview/news/releases/archive/04-063.shtml**

**National Energy and Technology Laboratory (Morgantown, W. Va. and Pittsburgh, Pa.)**

- Virtual power plant simulation software that enables design engineers to understand and optimize better the fluid mechanics that drive overall plant performance and efficiency. Jointly with Fluent Inc., ALSTOM Power Inc., Aspen Technology Inc. and West Virginia University.

**http://www.netl.doe.gov/publications/press/2004/tl_rd_awards04.html**

**National Renewable Energy Laboratory (Golden, Colo.)**

- The enzymatic hydrolysis of biomass cellulose to sugars technology, an innovative, lower-cost method for transforming plant material into the sugars that can be used to make fuels and chemicals. The new process is much more efficient and, applied to ethanol production, could displace more than 30 percent of current U.S. gasoline demand. Jointly with Genencor International and Novozymes Biotech Inc.

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- A thin-film solar cell that produces electricity directly from sunlight that has greater efficiency and is lighter weight and more flexible than competing devices used for military applications, portable power and boating and other marine applications. Jointly with Global Solar Energy and ITN Energy Systems.

**http://www.nrel.gov/news/press/2004/3404_technologies_lauded.html**

**Oak Ridge National Laboratory (Oak Ridge, Tenn.)**

- The highly selective, regenerable percholate treatment system, which helps trap and destroy percholate, the primary ingredient of rocket propellant that is increasingly being discovered in soil and water.
- The advanced heating system for high-performance aluminum forgings that uses radiant and convection heating for processing materials, reducing heating time and energy use. High-performance aluminum components are lighter, less costly substitutes for titanium in automotive and aerospace applications.
- which reduces heating time and energy consumption and produces forgings with significantly improved tensile and fatigue properties compared to those heated by conventional techniques. Jointly with Komtek, Queen City Forging Company, Forging Industry Association, Northeastern University and Infrared Heating Technologies.
- SniffEx, a compact, low-cost explosive vapor sensor for detecting and locating a variety of explosives that will have applications in counterterrorism, law enforcement, airport safety and landmine removal. Jointly with the University of Tennessee, Naval Research Laboratory, Bureau of Alcohol, Tobacco, Firearms and Explosives, and Transportation Security Administration.

**http://www.ornl.gov/info/press_releases/get_press_release.cfm?ReleaseNumber=mr20040701-01**

**Pacific Northwest National Laboratory (Richland, Wash.)**

- A holographic imager that creates a 360-degree, high-resolution 3-D scan of a body in less than 10 seconds, which can be used in security applications and by clothing designers and manufacturers to create better fitting off-the-rack and custom-fit apparel. Jointly with Intellifit Corporation.
- A polymer that can be used in chemical detector systems to improve significantly their sensitivity to airborne chemical agents that might be used in terrorist attacks. Jointly with Michigan Molecular Institute.
- A user-friendly, expandable library of more than one billion artificial antibodies for use in medical and biological research and homeland security technologies. Jointly with Massachusetts Institute of Technology.

**(MORE)**

- The Degradable by Design Deicer™, or D3, a family of non-toxic, biodegradable fluids used to remove and prevent the formation of ice on military and commercial aircraft and runways and on roadways and pavement. Jointly with Battelle.

**http://www.pnl.gov/news/2004/04-45.htm**

**Sandia National Laboratories (Albuquerque, N.M. and Livermore, Calif.)**

- A process for growing gallium nitride on an etched sapphire substrate that promises to make brighter, more efficient green, blue and white light emitting diodes (LEDs) or solid state lighting than is currently possible for use in displays or high-powered lamps such as traffic lights. A portion of the work was performed in collaboration with industrial partner Lumileds Lighting.
- Trilinos, a software framework and library that provides broad-ranging, robust and high-performance capabilities for solving numerical systems at the heart of many complex multiphysics engineering and scientific applications.

**http://www.sandia.gov/news-center/news-releases/2004/gen-science/r&d100.html**

**QRDC (Chaska, MN)**

- A Smart Screening System used by industrial processing plants to separate particles by size. Using an energy flow control system to transfer energy from "smart motors" directly to the screening medium, rather than to a vibrating screen machine, Smart Screens Systems reduces energy requirements, equipment maintenance, noise and vibration. DOE-funded and managed by NETL.

**RTI International (Research Triangle Park, NC)**

- A fluidized-bed desulfurization sorbent for use in fast fluidized-bed reactors to remove gaseous sulfur contaminants from high-temperature synthesis gas generated during the coal gasification process. DOE-funded and managed by NETL.

**Sage Electrochromics (Faribault, MN)**

- SageGlass®, an electronically tintable, ceramic-based electrochromic glass developed for use in building and transportation windows for control of solar heat and light. The glass can yield significant energy savings by reducing cooling electricity consumption, lowering peak electrical power demand and decreasing lighting costs. DOE-funded and managed by NETL. Jointly with, U.S. Air Force, National Institute of Standards and Technology, U.S. Army and the National Science Foundation.

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**Stolar Research Corporation (Raton, NM)**

- A radiofrequency device that transmits electromagnetic waves through the earth to generate high-resolution tomographic images of features below ground. Locating geologic anomalies and hazards prior to mining improves planning, lowers operating costs and reduces the risk of intersecting abandoned, potentially flooded mines. DOE-funded and managed by NETL.

**Virginia Polytechnic Institute and State University (Blacksburg, Va.)**

- Optical fiber sensor technology, designed to operate under "downhole" conditions, that allows efficient and economic recovery of petroleum by providing reliable, cost-effective, real-time measurement and monitoring of key physical wellbore parameters such as pressure, temperature, flow and acoustic wave patterns. DOE-funded and managed by NETL.

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